

2017 Supplement to the Save Our Indian River Lagoon Project Plan for Brevard County, Florida



Prepared by:



Tetra Tech, Inc.
1558 Village Square Blvd, Suite 2
Tallahassee, Florida 32309
Phone: (850) 536-8115

Prepared for:

Brevard County
Natural Resources Management Department
2725 Judge Fran Jamieson Way, Building A
Viera, Florida 32940



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Section 1. Background

The Indian River Lagoon (IRL) system includes Mosquito Lagoon, Banana River Lagoon, and Indian River. This is a unique and diverse system that connects Volusia, Brevard, Indian River, St. Lucie, and Martin counties. The IRL is part of the National Estuary Program (NEP), one of 28 estuaries of National Significance, and has one of the greatest diversity of plants and animals in the nation. A large portion of the IRL system, 71% of its area and nearly half its length, is within Brevard County and provides County residents and visitors many opportunities and economic benefits.

However, the balance of this delicate ecosystem has been disturbed as development in the area has led to harmful impacts. Stormwater runoff from urban and agricultural areas, wastewater treatment facility (WWTF) discharges, septic systems, and excess fertilizer applications have led to harmful levels of nutrients and sediments entering the lagoon. These pollutants create cloudy conditions in the lagoon and feed algal blooms, both of which negatively affect the seagrass community that provides habitat for much of the lagoon's marine life. In addition, these pollutants lead to muck accumulation, which releases (fluxes) nutrients and hydrogen sulfide, depletes oxygen, and creates a lagoon bottom that is not hospitable to seagrass, shellfish, or other marine life.

Local governments and the St. Johns River Water Management District (SJRWMD) have been proactive in implementing projects over the last several decades. However, to restore the lagoon to health and prosperity, additional funds are needed to eliminate current excess loading and remove the legacy of previous excess loading. Therefore, the County placed a Save Our Indian River Lagoon ½ cent sales tax referendum on the ballot in November 2016, which passed and will provide a funding stream for the types of projects listed in this plan for Brevard County and its municipalities.

The Save Our Indian River Lagoon Project Plan (SOIRLPP) was adopted by the Brevard County Board of County Commissioners in August 2016. The plan outlines local projects planned to meet water quality targets and improve the health, productivity, aesthetic appeal, and economic value of the lagoon. The plan is being managed adaptively and will be updated at least annually with information on projects implemented and adjustments to the proposed projects.

This 2017 Supplement to the Save Our Indian River Lagoon Project Plan contains the first set of project updates, substitutions, and schedule accelerations to the plan. Local stakeholders submitted projects to Brevard County for inclusion in the plan. The appointed Citizen Oversight Committee reviewed the submitted projects and made a recommendation to the Board of County Commissioners on which projects should be added to the SOIRLPP. This supplement represents those projects that were reviewed by the Citizen Oversight Committee and approved for inclusion by the Board of County Commissioners.

Since funding from the approved sales tax is coming in earlier than anticipated when the SOIRLPP was prepared, a Year 0 was added to the timeline as part of this plan supplement. The projects in Year 0 are shovel-ready and ready for implementation. The total cost of the Year 0 projects is significantly less than the anticipated funding that will be raised through the sales tax. As in all years, any tax revenue received but not spent in Year 0 will stay in the Save Our Indian River Lagoon Trust Fund for use in future years of plan implementation.

Section 2. 2017 Project Revisions

Local municipalities and partners were invited to submit substitute projects for inclusion in the SOIRLPP. The projects submitted were required to deliver comparable nutrient removal benefits at similar costs as those projects listed in the original SOIRLPP for each sub-lagoon. To determine the amount of funding that a project would be eligible to receive from the Save Our Indian River Lagoon Trust Fund, the estimated total nitrogen (TN) reductions from the project were multiplied by the allowable cost/lb/yr of TN shown below in **Table 1** for that project type. The costs shown in **Table 1** are an average of the cost per pound of TN removed from the projects listed in the original SOIRLPP.

The requesting partners each submitted a “Save Our Indian River Lagoon Project Plan Project Submittal Request Form” to Brevard County for review of the proposed projects. The project forms were provided to the Citizen Oversight Committee to evaluate the potential for inclusion in the plan. The projects recommended by the Citizen Oversight Committee were presented to the Brevard County Board of County Commissioners for approval to include in this plan supplement.

Table 1: Cost per Pound of TN Removed by Project Type

| Project Type | Average Cost/lb/yr of TN |
|-----------------------------------|--------------------------|
| WWTF Upgrades for Reclaimed Water | \$214 |
| Septic System Removal | \$852 |
| Septic System Upgrades | \$802 |
| Stormwater Projects | \$88 |
| Muck Removal | \$408 |
| Oyster Reef/Living Shorelines | \$473 |

2.1. New Projects

The approved projects for inclusion in the 2017 SOIRLPP Supplement are summarized in **Table 2**. This table lists the responsible entity, project description, sub-lagoon location, TN and total phosphorus (TP) reductions, and the amount of Save Our Indian River Lagoon Trust Fund funding that is being applied to each project. Once the Supplement is approved by the County Commission, the projects are part of the SOIRLPP, and are reflected in the updated plan tables shown in **Section 3**.

Table 2: Summary of New Projects Added to Save Our Indian River Lagoon Project Plan

| Project Name | Responsible Entity | Project Description | Sub-Lagoon | TN Reduction (lbs/yr) | TP Reduction (lbs/yr) | Plan Funding |
|---|-------------------------------------|---|------------|-----------------------|-----------------------|--------------|
| Breeze Swept Septic to Sewer Connection | City of Rockledge | Breeze Swept is a neighborhood that consists of 143 single family lots that were constructed between 1958 and 1967. The City of Rockledge has undertaken the process of converting the entire neighborhood from septic to sewer. All of the major infrastructure has been installed and the sewer pipe has been stubbed out to each lot. The next phase will be to abandon the septic tanks and hook up to sewer. Most homes have two tanks that need to be abandoned. While the contractor has been laying the sewer lines, it has been evident that the septic tanks have been failing. | North IRL | 2,002 | N/A | \$880,530 |
| Merritt Island Septic Phase Out Project | Merritt Island Redevelopment Agency | This project consists of three phases: (1) septic phase out in the area of South Tropical Trail, (2) sanitary sewer construction along Cone Road, and (3) septic phase out in the Cone Road Industrial Park. This project proposes to connect approximately 80 properties to a central sewer system. In the Phase 1 area, there are approximately 20 properties that remain on septic systems and are experiencing financial difficulties in paying for the construction and connection costs associated with the hook up to the existing public sanitary sewer system. Many of these remaining properties contain commercial and/or multi-family apartments that require multiple hook ups and higher impact fees. Phase 2 includes the design and construction of the roadway improvements that allow for the installation of the sanitary sewer gravity system and stormwater treatment. Phase 3 consists of the connection of approximately 60 heavy commercial and industrial parcels to the newly constructed public sewer system. A large majority of the existing septic systems were constructed between 1950 and 1985, and the property owners will experience financial hardships relating to the cost of hook up. The funding will assist with the impact fees associated with hook up. | North IRL | 2,501 | N/A | \$320,000 |

| Project Name | Responsible Entity | Project Description | Sub-Lagoon | TN Reduction (lbs/yr) | TP Reduction (lbs/yr) | Plan Funding |
|----------------------------------|---------------------------------|---|-------------|-----------------------|-----------------------|--------------|
| Micco Sewer Line Extension | Sebastian Inlet Marina | Connecting 34 businesses and homes to sewer. | Central IRL | 1,633 | N/A | \$1,391,316 |
| Hoag Sewer Conversion | City of Melbourne | Installation of 4" forcemain to allow for 7 existing homes and potential 5 others to tie into municipal sewer and either come off existing septic tanks or, once lots are built, never install septic tanks. | Central IRL | 101 | N/A | \$86,031 |
| Penwood Sewer Conversion | City of Melbourne | Installation of 4" forcemain to allow for 4 existing homes and 8 potential homes to tie into municipal sewer and either come off existing septic tanks or, once lots are built, never install septic tanks. | Central IRL | 48 | N/A | \$40,632 |
| Long Point Park Upgrade | Brevard County Parks Department | This will be a denitrification wall to remove nitrogen from the ground water flowing from the Long Point campground rapid infiltration wet pond to the IRL. An 18"-24" denitrification wall will be constructed around the outside perimeter fence of the existing system. | Central IRL | 127 | N/A | \$101,854 |
| Cocoa Palms LID | City of Cape Canaveral | Exfiltration with treatment train. | Banana | 13 | 10 | \$1,144 |
| Carver Cove Swale | City of Cape Canaveral | Dry retention with treatment train. | Banana | 32 | 9 | \$2,816 |
| Holman Road Baffle Box | City of Cape Canaveral | Upgrade first generation boxes to 2nd generation baffle boxes. | Banana | 71 | 2 | \$6,248 |
| Center Street Baffle Box | City of Cape Canaveral | Upgrade first generation boxes to 2nd generation baffle boxes. | Banana | 297 | 9 | \$26,136 |
| International Drive Baffle Box | City of Cape Canaveral | Upgrade first generation boxes to 2nd generation baffle boxes. | Banana | 443 | 4 | \$34,700 |
| Angel Isles Baffle Box | City of Cape Canaveral | Upgrade first generation boxes to 2nd generation baffle boxes. | Banana | 131 | 3 | \$11,528 |
| Central Blvd Baffle Box | City of Cape Canaveral | Upgrade first generation boxes to 2nd generation baffle boxes. | Banana | 481 | 14 | \$34,700 |
| Church Street Type II Baffle Box | City of Cocoa | Retrofitting the Church Street discharge point with a Type 2 Nutrient Separating Baffle Box will be the third component of a complete neighborhood restoration and water quality project. The Church Street outfall currently discharges untreated, urban stormwater from a total area of approximately 73 acres. | North IRL | 237 | 29 | \$20,856 |

| Project Name | Responsible Entity | Project Description | Sub-Lagoon | TN Reduction (lbs/yr) | TP Reduction (lbs/yr) | Plan Funding |
|---|------------------------------|--|-------------|-----------------------|-----------------------|--------------|
| Bayfront Stormwater Project | City of Palm Bay | The project will construct wet detention pond to provide treatment and attenuation of stormwater runoff from U.S. 1 (a State roadway) and a 311 acre watershed. The project is a component of the treatment train for the watershed with existing wet detention and check dam conveyance channel constructed upstream. The project will reduce detrimental effects of untreated stormwater on the IRL seagrasses. The land has been purchased and the site is located 1,063 feet from the waters of Palm Bay and 2,077 feet from the convergence with the IRL. This project provides for the retrofit of 311 acres in added retention treatment. Currently the basin flows untreated into the IRL. | Central IRL | 348 | 83 | \$30,624 |
| Gleason Park Reuse | City of Indian Harbour Beach | Gleason Park is a central recreational feature and includes a large wet detention pond that treats the runoff from 128.9 acres. The City initiated an effort to reuse the stormwater from this wet pond in 2014 and installed three systems with the ability of drawing 58,200 gallons per week. The proposed project will expand the reuse potential of Gleason Park by adding two additional systems and rerouting the water to the south and southwestern portions of the surrounding park. This project should double the current capacity of the reuse in the park and draw an additional 9.29 ac-ft per year. This project would remove an additional 4.53% of TN and TP loading from several large stormwater basins. | Banana | 48 | 9 | \$4,224 |
| Denitrification Retrofit of Johns Rd Pond | Brevard County | Retrofit of existing stormwater pond bleed-down to flow through denitrification media. | Banana | 1,199 | N/A | \$105,512 |
| St. Teresa Basin Treatment | City of Titusville | Stormwater treatment in the St. Teresa basin before discharging to the IRL. | North IRL | 3,100 | 459 | \$272,800 |

| Project Name | Responsible Entity | Project Description | Sub-Lagoon | TN Reduction (lbs/yr) | TP Reduction (lbs/yr) | Plan Funding |
|---|--------------------|---|-------------|-----------------------|-----------------------|--------------|
| South Street Basin Treatment | City of Titusville | This project includes the installation of three 2 nd generation baffle boxes fitted with nutrient reducing media within the 235 acre South St. basin prior to the IRL outfall. Three boxes within this basin are needed due to the high flow along the main pipe line. By installing these boxes within sections prior to the main 72" pipe line, the nutrient reducing media will have more contact with the stormwater providing more removal. | North IRL | 987 | 156 | \$86,856 |
| La Paloma Basin Treatment | City of Titusville | This project includes the installation of an 2 nd generation baffle box fitted with nutrient reducing media within a 60' stormwater pipe run at the end of the 488 acre La Paloma basin prior to the IRL outfall. | North IRL | 2,367 | 346 | \$208,296 |
| Kingsmill-Aurora Phase Two | Brevard County | A traditional stormwater pond on major tributary to Eau Gallie River. The project prevents nutrients and sediment from reaching the lagoon. | North IRL | 4,176 | 814 | \$367,488 |
| Denitrification Retrofit of Huntington Pond | Brevard County | Retrofit of existing stormwater pond bleed-down to flow through denitrification media. | North IRL | 1,190 | N/A | \$104,720 |
| Denitrification Retrofit of Flounder Creek Pond | Brevard County | Retrofit of existing stormwater pond bleed-down to flow through denitrification media. | North IRL | 856 | N/A | \$75,328 |
| L1 Canal Bank Stabilization | Brevard County | Repair and stabilize channel banks to prevent further bank erosion with associated sediment and nutrient load. | North IRL | 995 | 383 | \$87,560 |
| Norwood Baffle Box Retrofit | City of Palm Bay | The project will retrofit or replace two existing baffle box structures for the existing drainage canal serving approximately 507 acres, improving treatment of the drainage basin by enhancing the treatment train with these structures. The structures will improve nutrient removal process from entering the Melbourne Tillman Canal C-1, which leads to Turkey Creek and IRL. | Central IRL | 1,631 | 254 | \$143,528 |
| Victoria Pond | City of Palm Bay | The project will install a baffle box structure for the existing drainage canal serving approximately 122 acres, improving treatment of the drainage basin by enhancing the treatment train with this structures. The structures will improve nutrient removal process from entering the IRL. | Central IRL | 267 | 42 | \$23,486 |

| Project Name | Responsible Entity | Project Description | Sub-Lagoon | TN Reduction (lbs/yr) | TP Reduction (lbs/yr) | Plan Funding |
|---|------------------------|--|-------------|-----------------------|-----------------------|--------------|
| Goode Park | City of Palm Bay | The project will retrofit or replace the existing outfall weir structure for the existing basin drainage which drains two drainage ponds serving approximately 254 acres, improving treatment of the drainage basin by enhancing the treatment train with this structure. The structures will improve nutrient removal upstream of Turkey Creek and IRL. | Central IRL | 794 | 121 | \$69,872 |
| Florin Pond | City of Palm Bay | The project will retrofit or replace the existing outfall structure for the existing drainage pond serving approximately 18.28 acres, improving treatment of the drainage basin by enhancing the treatment train with this structure. The structure will improve nutrient removal upstream of Turkey Creek and IRL. | Central IRL | 75 | 11 | \$6,600 |
| Cherie Down Park Swale | City of Cape Canaveral | Construction of swale system with Bold & Gold® media filter. | Banana | 27 | 9 | \$2,376 |
| Cape Shores Swales | City of Cape Canaveral | Construction of swale system with Bold & Gold® media filter. | Banana | 31 | 15 | \$2,746 |
| Justamere Rd Swale | City of Cape Canaveral | Construction of swale system with Bold & Gold® media filter. | Banana | 6 | 3 | \$528 |
| Hitching Post Berms | City of Cape Canaveral | Construction of a berm/swale system with Bold & Gold® filter media. | Banana | 29 | 22 | \$2,552 |
| Cliff Creek Baffle Box | City of Melbourne | Installation of a 2 nd generation baffle box with BAM. | North IRL | 3,952 | 797 | \$347,781 |
| Thrush Drive Baffle Box | City of Melbourne | Installation of a 2 nd generation baffle box with BAM. | North IRL | 3,661 | 773 | \$322,200 |
| Airport Boulevard Dry Retrofit | City of Melbourne | Installation of Bold and Gold® under an existing dry retention pond. | North IRL | 99 | 23 | \$8,718 |
| Nasa Boulevard Pond Retrofit | City of Melbourne | Installation of Bold and Gold® under an existing dry retention pond. | Central IRL | 1,097 | 157 | \$96,532 |
| General Aviation Drive Retrofit | City of Melbourne | Installation of Bold and Gold® under an existing dry retention swale. | Central IRL | 158 | 10 | \$13,937 |
| Stewart Road Dry Retrofit | City of Melbourne | Installation of Bold and Gold® under an existing dry retention swale. | Central IRL | 208 | 47 | \$18,344 |
| Mims Muck Removal: Outflow Water Nutrient Removal | Brevard County | The treatment of muck dredging spoil site out-flow water for the removal of nitrogen and phosphorus. | North IRL | 2,803 | 244 | \$400,000 |

| Project Name | Responsible Entity | Project Description | Sub-Lagoon | TN Reduction (lbs/yr) | TP Reduction (lbs/yr) | Plan Funding |
|------------------------------------|--------------------|---|-------------|-----------------------|-----------------------|---------------------|
| Grand Canal Muck Dredging | Brevard County | Dredging and outflow nutrient reduction of approximately 605,000 cy of muck sediments from an area of 97 acres within the Grand Canal system. | North IRL | 27,802 | 2,447 | \$10,000,000 |
| Sykes Creek Muck Dredging | Brevard County | Dredging and outflow water nutrient reduction of approximately 660,000 cy of muck sediments from an area of 187 acres within Sykes Creek. | Banana | 30,693 | 2,722 | \$10,000,000 |
| Turkey Creek Shoreline Restoration | City of Palm Bay | Construct a living shoreline of 1,200 linear feet. | Central IRL | 240 | 82 | \$113,500 |
| Total | - | - | - | 96,956 | 10,109 | \$25,874,599 |

2.2. Unfunded Projects

In order to include the new projects approved as part of this supplement, the funding had to be shifted from the least cost-effective or shovel-ready projects of the same or similar type that were listed in the original SOIRLPP. This balance is shown in **Figure 1**. The projects listed in **Table 3** no longer have funding for implementation through the Save Our Indian River Lagoon Trust Fund. If additional funding is obtained from other sources, such as grants or legislative appropriations, these projects could be added back to the SOIRLPP tables through a streamlined approval process. Since these projects were previously approved for inclusion in the SOIRLPP, if additional funds become available during the fiscal year, individual projects in **Table 3** could be funded with Trust Fund dollars, if their reinsertion is recommended by the Citizen Oversight Committee and if a budget change request for such projects is approved by the Board of County Commissioners. This accelerated process would not need to wait for the next annual plan update. Reinsertion of these projects into the funded SOIRLPP would be reflected retroactively in the next annual supplement to the SOIRLPP. For this current supplement, the projects listed in **Table 3** are no longer part of the SOIRLPP tables included in **Section 3**.

Table 3: Summary of Unfunded Projects from the Save Our Indian River Lagoon Project Plan

| Sub-lagoon | Project Name | Cost | TN Reductions (lbs/yr) | TP Reductions (lbs/yr) |
|---------------------|-------------------------------------|---------------------|------------------------|------------------------|
| North IRL | Sykes Creek C septic system removal | \$1,700,000 | 1,426 | N/A |
| Central IRL | 112 septic system upgrades | \$1,792,000 | 2,233 | N/A |
| Banana River Lagoon | Stormwater project in Basin 754 | \$100,000 | 734 | 95 |
| Banana River Lagoon | Stormwater project in Basin 602 | \$100,000 | 1,068 | 109 |
| North IRL | Stormwater project in Basin 1434 | \$125,000.00 | 932 | 112 |
| North IRL | Stormwater project in Basin 1151 | \$125,000.00 | 1,057 | 141 |
| North IRL | Stormwater project in Basin 1078 | \$125,000.00 | 1,250 | 187 |
| North IRL | Stormwater project in Basin 1399 | \$125,000.00 | 1,570 | 256 |
| North IRL | Stormwater project in Basin 1301 | \$125,000.00 | 1,025 | 154 |
| North IRL | Stormwater project in Basin 1368 | \$125,000.00 | 1,311 | 200 |
| North IRL | Stormwater project in Basin 408 | \$125,000.00 | 1,179 | 170 |
| North IRL | Stormwater project in Basin 338 | \$125,000.00 | 1,902 | 188 |
| North IRL | Stormwater project in Basin 1367 | \$100,000.00 | 1,042 | 146 |
| North IRL | Stormwater project in Basin 1384 | \$100,000.00 | 923 | 142 |
| North IRL | Stormwater project in Basin 1318 | \$100,000.00 | 1,124 | 148 |
| North IRL | Stormwater project in Basin 155 | \$100,000.00 | 1,149 | 122 |
| North IRL | Stormwater project in Basin 289 | \$100,000.00 | 1,112 | 223 |
| North IRL | Stormwater project in Basin 193 | \$100,000.00 | 1,316 | 198 |
| North IRL | Stormwater project in Basin 1441 | \$100,000.00 | 1,034 | 149 |
| North IRL | Stormwater project in Basin 660 | \$100,000.00 | 844 | 212 |
| North IRL | Stormwater project in Basin 952 | \$100,000.00 | 1,251 | 212 |
| Banana River Lagoon | 29% Sykes Creek dredging | \$7,000,000 | 12,536 | 1,112 |
| Banana River Lagoon | 38% Cape Canaveral Area dredging | \$10,000,000 | 33,051 | 5,026 |
| North IRL | 29% Grand Canal dredging | \$7,000,000 | 11,356 | 1,000 |
| North IRL | 38% Eau Gallie dredging | \$10,000,000 | 33,512 | 5,023 |
| Total | Total | \$39,592,000 | 115,937 | 15,325 |



Figure 1: Comparison of the Original Plan Cost by Project Category (Left) versus the 2017 Plan Supplement Cost by Project Category (Right)

Section 3. Updated Save Our Indian River Lagoon Project Plan Tables

The SOIRLPP summary tables were updated to include the nutrient reductions and costs of the new projects listed in **Table 2**, and to remove the nutrient reductions and costs associated with the unfunded projects listed in **Table 3**. The tables below use the same table numbers as the original SOIRLPP.

The updated tables include the summary from the SOIRLPP Executive Summary (**Table ES-1**), comparisons to the load reductions needed to achieve the County's total maximum daily loads (TMDLs) for each segment of the lagoon (**Table 38** through **Table 44**), summary of the nutrient load reductions achieved and costs associated with the projects (**Table 45**), and timeline that includes the Year 0 projects (**Table 46**).

Table ES-1: Summary of the Project Types, Costs, and Nutrient Reductions from the Save Our Lagoon Project Plan

| Project Category | Project Type | Estimated Total Project Cost | Nitrogen Reductions (lbs/yr) | Average Cost/lb/yr of TN | Phosphorus Reductions (lbs/yr) | Average Cost/lb/yr of TP |
|-------------------------|--|-------------------------------------|-------------------------------------|---------------------------------|---------------------------------------|---------------------------------|
| Reduce | Fertilizer Management/Public Education | \$625,000 | 6,123 | \$102 | 813 | \$769 |
| | WWTF Upgrades for Reclaimed Water | \$9,400,000 | 40,778 | \$213 | TBD | TBD |
| | Septic System Removal | \$42,782,509 | 62,794 | \$718 | N/A | N/A |
| | Septic System Upgrades | \$20,486,000 | 25,553 | \$802 | N/A | N/A |
| | Stormwater Projects | \$10,760,380 | 120,221 | \$87 | 17,606 | \$594 |
| Remove | Muck Removal | \$198,500,000 | 485,585 | \$412 | 68,985 | \$2,847 |
| Restore | Oyster Reef Living Shorelines | \$10,000,000 | 21,120 | \$473 | 7,181 | \$1,393 |
| Respond | Projects Monitoring | \$10,000,000 | - | - | - | - |
| Total | Total | \$302,553,889 | 762,174 | \$397 (average) | 94,585 | \$3,199 (average) |

Table 38: Banana River Lagoon Project Reductions to Meet Five-Month TMDL

| Project | TN Reductions (lbs/yr) | TP Reductions (lbs/yr) |
|--------------------------------------|------------------------|------------------------|
| Fertilizer Ordinance Implementation | 2,945 | 603 |
| Future Fertilizer Education | 393 | 52 |
| Septic System Removal | 5,723 | 0 |
| Septic System Upgrade | 2,144 | 0 |
| Stormwater Projects | 14,895 | 2,220 |
| BMAP Projects (2010-February 2016) | 5,303 | 1,440 |
| Total | 31,403 | 4,315 |
| TMDL Reductions (five-month) | 30,337 | 2,737 |
| % of TMDL Reductions Achieved | 103.5% | 157.6% |

Table 39: Banana River Lagoon Project Reductions Compared to Full Year Loading

| Project | TN Reductions (lbs/yr) | TP Reductions (lbs/yr) |
|-------------------------------------|------------------------|------------------------|
| Fertilizer Ordinance Implementation | 7,068 | 1,446 |
| Future Fertilizer Education | 943 | 125 |
| Septic System Removal | 13,736 | 0 |
| Septic System Upgrade | 5,145 | 0 |
| Stormwater Projects | 49,397 | 6,793 |
| BMAP Projects (2010-February 2016) | 12,726 | 3,456 |
| Total | 89,015 | 11,820 |
| Starting Load (full year) | 477,020 | 44,269 |
| % of Starting Load Reduced | 18.7% | 26.7% |
| Full-Year TMDL % Reductions | 9.0% | 9.6% |

Table 40: North IRL Project Reductions to Meet Five-Month TMDL

| Project | TN Reductions (lbs/yr) | TP Reductions (lbs/yr) |
|--------------------------------------|------------------------|------------------------|
| Fertilizer Ordinance Implementation | 8,070 | 1,651 |
| Future Fertilizer Education | 1,077 | 143 |
| WWTF Upgrade for Reclaimed Water | 9,578 | TBD |
| Septic System Removal | 7,722 | 0 |
| Septic System Upgrade | 4,279 | 0 |
| Stormwater Projects | 18,840 | 3,175 |
| BMAP Projects (2010-February 2016) | 16,983 | 3,180 |
| Total | 66,549 | 8,149 |
| TMDL Reductions (five-month) | 61,447 | 7,410 |
| % of TMDL Reductions Achieved | 108.3% | 110.0% |

Table 41: North IRL Project Reductions Compared to Full Year Loading

| Project | TN Reductions (lbs/yr) | TP Reductions (lbs/yr) |
|-------------------------------------|------------------------|------------------------|
| Fertilizer Ordinance Implementation | 19,368 | 3,962 |
| Future Fertilizer Education | 2,584 | 343 |
| WWTF Upgrade for Reclaimed Water | 22,988 | TBD |
| Septic System Removal | 18,532 | 0 |
| Septic System Upgrade | 10,270 | 0 |
| Stormwater Projects | 54,537 | 8,314 |
| BMAP Projects (2010-February 2016) | 40,758 | 7,632 |
| Total | 169,037 | 20,251 |
| Starting Load (full year) | 988,847 | 99,340 |
| % of Starting Load Reduced | 17.1% | 20.4% |
| Full-Year TMDL % Reductions | 11.4% | 11.4% |

Table 42: Central IRL Project Reductions to Meet Five-Month TMDL

| Project | TN Reductions (lbs/yr) | TP Reductions (lbs/yr) |
|--------------------------------------|------------------------|------------------------|
| Fertilizer Ordinance Implementation | 8,108 | 1,659 |
| Future Fertilizer Education | 1,082 | 144 |
| WWTF Upgrade for Reclaimed Water | 7,413 | TBD |
| Septic System Removal | 12,719 | 0 |
| Septic System Upgrade | 4,224 | 0 |
| Stormwater Projects | 9,561 | 1,499 |
| C-1 Re-Diversion | 53,892 | 6,295 |
| BMAP Projects (2010-February 2016) | 378 | 243 |
| Total | 97,377 | 9,840 |
| TMDL Reductions (five-month)* | 67,547 | 8,151 |
| % of TMDL Reductions Achieved | 144.2% | 120.7% |

* The TMDL reductions are for Zone A only; however, some of the project reductions are from Zone SEB. There are sufficient projects to achieve the Zone A reductions without the projects in the Zone SEB.

Table 43: Central IRL Project Reductions Compared to Full Year Loading

| Project | TN Reductions (lbs/yr) | TP Reductions (lbs/yr) |
|-------------------------------------|------------------------|------------------------|
| Fertilizer Ordinance Implementation | 19,460 | 3,981 |
| Future Fertilizer Education | 2,596 | 345 |
| WWTF Upgrade for Reclaimed Water | 17,790 | TBD |
| Septic System Removal | 30,526 | 0 |
| Septic System Upgrade | 10,138 | 0 |
| Stormwater Projects | 16,287 | 2,499 |
| C-1 Re-Diversion | 129,341 | 15,108 |
| BMAP Projects (2010-February 2016) | 908 | 582 |
| Total | 227,046 | 22,515 |
| Starting Load (full year) | 698,937 | 95,051 |
| % of Starting Load Reduced | 32.5% | 23.7% |
| Full-Year TMDL % Reductions* | 22.9% | 21.5% |

* The TMDL reductions are for Zone A only; however, some of the project reductions are from Zone SEB. There are sufficient projects to achieve the Zone A reductions without the projects in the Zone SEB.

Table 44: Muck Removal and Oyster Reef Project Reductions Compared to Nutrients from Muck Flux

| Project Type | Mosquito Lagoon | | Banana River Lagoon | | North IRL | | Central A | |
|---|-----------------|--------------|---------------------|--------------|--------------|--------------|--------------|--------------|
| | TN (lbs/yr) | TP (lbs/yr) | TN (lbs/yr) | TP (lbs/yr) | TN (lbs/yr) | TP (lbs/yr) | TN (lbs/yr) | TP (lbs/yr) |
| Muck Removal Project Reductions | 35,000 | 5,250 | 162,492 | 22,466 | 228,593 | 32,368 | 59,500 | 8,900 |
| Oyster Reef Living Shoreline Reductions | N/A | N/A | 8,934 | 3,038 | 9,124 | 3,102 | 3,062 | 1,041 |
| Total Project Reductions | 35,000 | 5,250 | 171,426 | 25,504 | 237,717 | 35,470 | 62,562 | 9,941 |
| Estimated Muck Flux Loading | 97,400 | 14,600 | 452,000 | 68,400 | 660,000 | 99,000 | 170,000 | 25,000 |
| % of Muck Flux Reduced | 35.9% | 36.0% | 37.9% | 37.3% | 36.0% | 35.8% | 36.8% | 39.8% |

Table 45: Summary of Projects, Estimated TN and TP Reductions, and Costs

| Project | Estimated Total Project Cost | TN Reductions (lbs/yr) | Cost/lb/yr of TN | TP Reductions (lbs/yr) | Cost/lb/yr of TP |
|---|-------------------------------------|-------------------------------|-------------------------|-------------------------------|--------------------------|
| Fertilizer Management/Public Education | \$625,000 | 6,123 | \$102 | 813 | \$769 |
| WWTF Upgrades for Reclaimed Water | - | - | - | - | - |
| City of Titusville Osprey WWTF | \$8,000,000 | 22,988 | \$348 | TBD | TBD |
| City of Palm Bay WRF | \$1,400,000 | 17,790 | \$79 | TBD | TBD |
| Septic System Removal | - | - | - | - | - |
| Banana River Lagoon Septic System Connections | \$12,260,000 | 13,736 | \$893 | N/A | N/A |
| North IRL Septic System Connections | \$12,320,530 | 18,532 | \$665 | N/A | N/A |
| Central IRL Septic System Connections | \$18,201,979 | 30,526 | \$596 | N/A | N/A |
| Septic System Upgrades | - | - | - | - | - |
| Banana River Lagoon Septic System Upgrades | \$4,128,000 | 5,145 | \$802 | N/A | N/A |
| North IRL Septic System Upgrades | \$8,240,000 | 10,270 | \$802 | N/A | N/A |
| Central IRL Septic System Upgrades | \$8,118,000 | 10,138 | \$801 | N/A | N/A |
| Stormwater Projects | - | - | - | - | - |
| Banana River Lagoon Stormwater Projects | \$4,605,844 | 49,397 | \$93 | 6,793 | \$678 |
| North IRL Stormwater Projects | \$4,851,603 | 54,537 | \$89 | 8,314 | \$584 |
| Central IRL Stormwater Projects | \$1,302,933 | 16,287 | \$80 | 2,499 | \$521 |
| Muck Removal | - | - | - | - | - |
| Mosquito Lagoon Muck Removal | \$16,100,000 | 35,000 | \$460 | 5,250 | \$3,067 |
| Banana River Lagoon Muck Removal | \$71,750,000 | 162,492 | \$442 | 22,466 | \$3,194 |
| North IRL Muck Removal | \$89,650,000 | 228,593 | \$392 | 32,368 | \$2,770 |
| Central IRL Muck Removal | \$21,000,000 | 59,500 | \$353 | 8,900 | \$2,360 |
| Oyster Reef Living Shorelines | \$10,000,000 | 21,120 | \$473 | 7,181 | \$1,393 |
| Projects Monitoring | \$10,000,000 | - | - | - | - |
| Total | \$302,553,889 | 762,174 | \$397 (average) | 94,585 | \$3,199 (average) |

Table 46: Timeline for Funding Needs

| Project Name | Total Project Cost | Cost by Year | | | | | | | | | | |
|--|--------------------|---|---|-------------------------------|-----------------------------------|-------------------|----------------------------|-----------------------|-------------------------|-------------------|---------------------|--------------------|
| | | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Fertilizer Management/ Public Education | \$625,000 | - | Year 1 of Program | Year 2 of Program | Year 3 of Program | Year 4 of Program | Year 5 of Program | - | - | - | - | - |
| WWTF Upgrades | - | - | \$125,000 | \$125,000 | \$125,000 | \$125,000 | \$125,000 | - | - | - | - | - |
| City of Titusville Osprey WWTF | \$8,000,000 | Design & Permitting | Design & Start Construction | Complete Construction | - | - | - | - | - | - | - | - |
| City of Palm Bay WRF | \$1,400,000 | \$300,000 | \$1,700,000 | \$6,000,000 | - | - | - | - | - | - | - | - |
| Septic Removal | - | - | Construction | - | - | - | - | - | - | - | - | - |
| | | - | \$1,400,000 | - | - | - | - | - | - | - | - | - |
| Banana River Lagoon | \$12,260,000 | - | - | - | - | - | - | - | - | - | - | - |
| | | Sykes M & Sykes T Engineering | Sykes Creek N | Sykes Creek M | Sykes Creek T | Sykes Creek X | Sykes Creek V | Sykes Creek U | Sykes Creek Z | - | - | - |
| | | \$500,000 | \$1,720,000 | \$910,000 | \$2,530,000 | \$280,000 | \$1,960,000 | \$2,900,000 | \$1,460,000 | - | - | - |
| North IRL | \$12,320,530 | S. Central C Eng., Rockledge Breeze Swept, MIRA | South Central C | Cocoa K & Melbourne | Cocoa J, Rockledge, Titusville | S Beaches A | South Central A | South Central D | - | - | - | - |
| | | \$1,650,530 | \$2,190,000 | \$920,000 | \$2,540,000 | \$840,000 | \$2,300,000 | \$1,880,000 | - | - | - | - |
| Central IRL | \$18,201,979 | Micco & 2 Melbourne | Palm Bay B and Sewer Hookups | - | West Melbourne | Palm Bay A | - | - | - | - | - | - |
| | | \$1,517,979 | 12,464,000 | - | \$2,240,000 | \$1,980,000 | - | - | - | - | - | - |
| Septic Upgrades | - | - | - | - | - | - | - | - | - | - | - | - |
| Banana River Lagoon | \$4,128,000 | - | 24 Upgrades | 26 Upgrades | 26 Upgrades | 26 Upgrades | 26 Upgrades | 26 Upgrades | 26 Upgrades | 26 Upgrades | 26 Upgrades | 26 Upgrades |
| | | - | \$384,000 | \$416,000 | \$416,000 | \$416,000 | \$416,000 | \$416,000 | \$416,000 | \$416,000 | \$416,000 | \$416,000 |
| North IRL | \$8,240,000 | - | 35 Upgrades | 40 Upgrades | 55 Upgrades | 55 Upgrades | 55 Upgrades | 55 Upgrades | 55 Upgrades | 55 Upgrades | 55 Upgrades | 55 Upgrades |
| | | - | \$560,000 | \$640,000 | \$880,000 | \$880,000 | \$880,000 | \$880,000 | \$880,000 | \$880,000 | \$880,000 | \$880,000 |
| Central IRL | \$8,118,000 | - | Long Point &37 Upgrades | 50 Upgrades | 65 Upgrades | 65 Upgrades | 65 Upgrades | 65 Upgrades | 65 Upgrades | 65 Upgrades | 25 Upgrades | |
| | | - | \$694,000 | \$800,000 | \$1,040,000 | \$1,040,000 | \$1,040,000 | \$1,040,000 | \$1,040,000 | \$1,040,000 | \$384,000 | |
| Stormwater Projects | - | - | - | - | - | - | - | - | - | - | - | - |
| Banana River Lagoon | \$4,605,844 | 7 Cape Canaveral & 1 Indian Harbour | 4 Cape Canaveral & 4 County Projects | 6 Projects | 6 Projects | 6 Projects | 6 Projects | 6 Projects | 6 Projects | - | - | - |
| | | \$121,496 | \$609,348 | \$850,000 | \$625,000 | \$600,000 | \$600,000 | \$600,000 | \$600,000 | - | - | - |
| North IRL | \$4,851,603 | 1 Cocoa Project | 3 Titusville, 5 County, 3 Melbourne | 3 Projects | 4 Projects | 5 Projects | 5 Projects | 2 Projects | | - | - | - |
| | | \$20,856 | \$2,055,747 | \$525,000 | \$675,000 | \$750,000 | \$625,000 | \$250,000 | | - | - | - |
| Central IRL | \$1,302,933 | 1 Palm Bay | 4 Palm Bay & 3 Melbourne Projects | 1 Project | 1 Project | 1 Project | 1 Project | - | - | - | - | - |
| | | \$30,624 | \$372,309 | \$275,000 | \$225,000 | \$200,000 | \$200,000 | - | - | - | - | - |
| Muck Removal | - | - | - | - | - | - | - | - | - | - | - | - |
| Mosquito Lagoon | \$16,100,000 | - | - | - | - | - | - | - | - | - | Near Haulover Canal | - |
| | | - | - | - | - | - | - | - | - | - | \$16,100,000 | - |
| Banana River Lagoon | \$71,750,000 | - | 71% Sykes Creek | 8% of Canals, Mathers Area | Newfound Harbor Area | 8% of Canals | 62% Cape Canaveral Area | 8% of Canals | Pineda Causeway Area | 8% of Canals | Cocoa Beach Area | 8% of Canals |
| | | - | \$10,000,000 | \$10,500,000 | \$3,500,000 | \$5,250,000 | \$16,250,000 | \$5,250,000 | \$3,500,000 | \$5,250,000 | \$7,000,000 | \$5,250,000 |
| North IRL | \$89,650,000 | Mims Outflow | 71% Grand Canal, 19% Eau Gallie Area | 31% Eau Gallie Area | 12% Eau Gallie Area | Titusville Area | - | 1/2 Rockledge Area | 1/2 Rockledge Area | Cocoa Area | - | - |
| | | \$400,000 | \$15,000,000 | \$8,000,000 | \$3,250,000 | \$14,000,000 | - | \$14,000,000 | \$14,000,000 | \$21,000,000 | - | - |
| Central IRL | \$21,000,000 | - | - | - | Mullet Creek Area | - | Melbourne Causeway | - | Goat Creek Area | - | Trout Creek Area | - |
| | | - | - | - | \$7,000,000 | - | \$7,000,000 | - | \$3,500,000 | - | \$3,500,000 | - |
| Oyster/Living Shorelines | - | - | - | - | - | - | - | - | - | - | - | - |
| Banana River Lagoon | \$4,230,000 | - | 0.846 Miles | 0.846 Miles | 0.846 Miles | 0.846 Miles | 0.846 Miles | 0.846 Miles | 0.846 Miles | 0.846 Miles | 0.846 Miles | 0.846 Miles |
| | | - | \$423,000 | \$423,000 | \$423,000 | \$423,000 | \$423,000 | \$423,000 | \$423,000 | \$423,000 | \$423,000 | \$423,000 |
| North IRL | \$4,320,000 | - | 0.864 Miles | 0.864 Miles | 0.864 Miles | 0.864 Miles | 0.864 Miles | 0.864 Miles | 0.864 Miles | 0.864 Miles | 0.864 Miles | 0.864 Miles |
| | | - | \$432,000 | \$432,000 | \$432,000 | \$432,000 | \$432,000 | \$432,000 | \$432,000 | \$432,000 | \$432,000 | \$432,000 |
| Central IRL | \$1,450,000 | - | Palm Bay & 0.063 Miles | 0.290 Miles | 0.290 Miles | 0.290 Miles | 0.290 Miles | 0.290 Miles | 0.290 Miles | 0.290 Miles | 0.290 Miles | 0.290 Miles |
| | | - | \$145,000 | \$145,000 | \$145,000 | \$145,000 | \$145,000 | \$145,000 | \$145,000 | \$145,000 | \$145,000 | \$145,000 |
| Project Monitoring | \$10,000,000 | - | Year 1 Monitoring | Year 2 Monitoring | Year 3 Monitoring | Year 4 Monitoring | Year 5 Monitoring | Year 6 Monitoring | Year 7 Monitoring | Year 8 Monitoring | Year 9 Monitoring | Year 10 Monitoring |
| | | - | \$1,000,000 | \$1,000,000 | \$1,000,000 | \$1,000,000 | \$1,000,000 | \$1,000,000 | \$1,000,000 | \$1,000,000 | \$1,000,000 | \$1,000,000 |
| Total | \$302,553,889 | \$4,541,485 | \$51,274,404 | \$31,961,000 | \$27,021,000 | \$28,336,000 | \$33,396,000 | \$29,216,000 | \$27,396,000 | \$30,586,000 | \$30,280,000 | \$8,546,000 |